Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

parasite but a greater manifestation of disease due to lack of vitality in the hosts. These instances, therefore, form no exception to the general rule, that dry weather is not advantageous for the development of the *Peronosporeæ.*

In preparing this paper the writer has drawn freely upon his article "Downy Mildews in a dry Season" in Ames' (Iowa) College Bulletin, 1888, which gives an account for the years 1886 and 1887, and in some instances the form of statement therein used is here reproduced.

## AN INTERESTING UROMYCES.

By BYRON D. HALSTED.*

The following description is of a *Uromyces* collected the past autumn, which has the habit of infesting the perigynia of a sedge, causing them to assume a quite unnatural dark color before their time of maturing.

UROMYCES PERIGYNIUS, HALSTED. Sori one-half to $2^{mm}$ in diameter, forming dark-brown, nearly globular patches upon the outside and between the veins of the perigynia, not infrequently upon both surfaces of the younger leaves, where the patches are often three times as long as broad. Teleutospores somewhat variable, 4–6 by 8–10$\mu$, with a prominent brown free end ranging from acute to wedge shaped. Contents usually granular and often with a large oil globule. Pedicel two to three times the length of the spore, slender and hyaline.

On *Carex intumescens*, near Ames, Iowa, September, 1888. D. G. Fairchild.

The other known species of *Uromyces* upon *Carex* is *U. Caricis* of Peck (Mycotheca Universalis No. 746), which is very different in habit and characteristics of the spore. It is reported only upon *Carex stricta* and not upon the perigynia. In making the comparison it was interesting to observe that with *U. Caricis, Pk.*, there were ocasional double spores among those of normal form. Sometimes a half dozen adjoining spores in a partially crushed sorus would be of the puccinia type. Those who are subscribers to Ellis and Everhart's N. A. F. may expect the *Uromyces* above described in the next issue.

## NEW SPECIES OF KANSAS FUNGI.

By W. A. KELLERMAN and W. T. SWINGLE.

TILLETIA BUCHLOËANA *n. s.* In the much enlarged and mostly globular ovaries of *Buchloë dactyloides*, abnormally borne on the male plants; often all or nearly all the staminate spikelets produce the ovaries, all of which are infested. Spores dirty brown in mass, as seen singly dusky or brownish fuscous, never very dark, perfectly spherical or very slightly oval, regular in size, 16½–21$\mu$ diam., but mostly 18–20$\mu$ (exclusive of hyaline envelope). The outer wall of the spores is marked with scattering, regular spines or faint reticulations (formed by coalescence of the spines?) ½–1½$\mu$ high, but completely enveloped by the outer hyaline layer, which is 1½–4$\mu$ thick. The outer wall is about 1½–2$\mu$ thick, and is the darkest colored part of the spore; immediately within this is a thinner, clear, lighter colored wall ¾–1$\mu$ thick; following this is a layer of variable thickness, usually finely but sometimes coarsely granular. In the center of the spore is a very light homogeneous usually spherical body 7–10$\mu$, mostly 7½–9$\mu$ in diameter.

---

* Rutgers College, New Brunswick, N. J.

On male plants of *Buchloë dactyloides*, western and southwestern Kansas (Trego County, 1886, and Ford County, June, 1888).

In some cases, especially in young spores, the hyaline layer is seen to be made of two distinct layers, the inner extending from the wall to the tips of the spines and being slightly darker than the outer layer. The immature spores when placed in water become very much swollen and are almost colorless, except the collapsed central body. Mixed with the spores were seen in many cases a hyaline, branched, septate mycelium, 3–4½$\mu$ diam., but whether connected with the spores or not can not be said. Attempts to induce germination of the spores failed.

The infected plants are easily detected by their apparently denser and darker inflorescence, but the monstrosity consists solely in the production of ovaries in the male plants. These are in every case filled with the mass of spores and are very much enlarged pushing the glumes wide apart. In size the smutted ovaries are 1.3–1.8 by 0.6–1.3$^{mm}$. The few female plants collected in the same localities were free from the fungus. Figs. 1–11.

USTILAGO ANDROPOGONIS, *n. s.** In the ovaries of *Andropogon provincialis* and *A. Hallii*, not only the sessile flowers (which are perfect), but also the pedicelled ones, which are normally staminate, often produce the cylindrical elongated infested ovaries; spores in mass intensely black, as seen singly dark brown or black, subglobose or slightly oval, sometimes oblong elliptical or ovate, slightly angular. Wall thick (¾–2$\mu$, mostly 1½$\mu$) very finely and closely echinulate. Contents coarsely and evenly granular or sometimes homogeneous, 12–19$\mu$ by 9½–16$\mu$, mostly 13½–15½$\mu$ by 11–14$\mu$.

---

* Since sending the description of this species to the printer we have received Ellis & Everhart's North American Fungi Cent. XXIII. No. 2265 *Sorosporium Ellisii*, var. *occidentalis*, on *Andropogon furcatus*, Bismarck, Dak., August, 1884, A. B. Seymour, is the same as *Ustilago andropogonis*, Kell. & Sw. The Dakota specimens were examined by us as were the youngest Kansas specimens (collected June 26, 1888) but in none could the spore masses characterizing *Sorosporium* be seen. Besides, the spores are larger and different in color, shape, thickness, and character of wall, number and size of spores, etc., from *Sorosporium Ellisii*. The species as far as can be determined without a knowledge of the germination of the spores certainly seems to be a good *Ustilago*. No. 2265, *b*. N. A. F. on *Andropogon Virginicus*, Newfield, N. J., is apparently different from the above and a true *Sorosporium*.

The spores found on *Andropogon provincialis* are somewhat narrower and longer than on *A. Hallii*, and more often oval than subglobose. They were also more variable in size and shape. On *A. provincialis* the spores were 12–19 by 9½–13½μ, mostly 13–16 by 10–13½μ, while on *A. Hallii* they were 13–18½ by 11–16μ, mostly 13½–15 by 13–14μ. Attempts to induce germination failed.

Southwestern Kansas, June, 1888. On *Andropogon Hallii*, Seward County, June 26, and on *A. provincialis*, Harper County, July 14, 1888. The affected ovaries on *A. provincialis* are 2.5–7 by 1.2–8$^{\mathrm{mm}}$, and those *A. Hallii*, 6–8 by 1.4–8$^{\mathrm{mm}}$.

This species is clearly distinct from *Ustilago Ischaemi* Fckl., and *U. cylindrica*, Pk. both in size of spores and in being confined to the ovaries. Figs. 12–26.

USTILAGO BOUTELOUÆ *n. s.* In the enlarged ovaries of *Bouteloua oligostachya;* spores in mass, brownish; when seen singly, dark brown or sometimes light brown, oval, subglobose, or elliptical, regular or sometimes slightly angular; wall thin (about ½μ) irregularly, rather sparingly, tuberculate-echinulate (spines short, 1½–3μ apart); contents homogeneous or often containing a single large granule, 8–12 by 6–10μ, mostly 8½–10 by 8–9½μ. Germination in water by means of a septate promycelial tube bearing one or two elongate cylindrical sporidia just below the septa at the end. Promycelial tube simple or rarely branched, hyaline, 2–4 septate, 25–50μ by 2–4μ. Sporidia cylindrical, ends subacute, hyaline, 9–13μ by 2–2½μ.

Mixed with the spores in some cases were seen hyaline bodies of varying sizes composed of cells somewhat smaller than the spores, arranged in a sublinear manner. The spores germinated readily in water at a temperature of 37° C. and the promycelial tubes often separate readily from the spores when they have attained their growth. The sporidia were observed budding in a few cases.

On *Bouteloua oligostachya*, Manhattan, Kans., autumn and winter, 1888. In many cases the affected plants could be detected at a glance, as the spikelets were retained long after they had fallen from the healthy plants. The smutted ovaries are 1.5 - 4.6 by 0.8 - 1.7$^{\mathrm{mm}}$.

The grasses attacked by the three preceding species of fungi are important for the West. They furnish a very large part of the pasturage, and even a considerable portion of the hay crop. The smuts, preventing the formation of seed, will therefore, when abundant, likely do damage of much consequence.

ÆCIDIUM DALEÆ *n. s.* Spots none; æcidia on the leaflets or rarely on the petioles, mostly hypophyllous but often also sparingly epiphyllous, numerous, crowded, occupying from a third to the whole of the leaflet, which becomes yellowish in color as far as attacked. Peridia white (or pinkish?), usually slender ($\frac{1}{5}$–$\frac{1}{3}^{\mathrm{mm}}$ diameter), of moderate length ($\frac{1}{6}$–$\frac{1}{3}^{\mathrm{mm}}$), cylindrical or very often constricted above, open from the first, never hemispherical; margin crenate, subentire, or crumbling or lacerated into many short erect or slightly reflexed segments. Peridial cells, below small and polygonal, above very large and having a flattened conical portion projecting outward and upward from the inner side, sometimes containing a few yellow granules, 18–42 by 15–36$\mu$, wall 2–5$\mu$ thick, conspicuously tuberculate, the warts forming short lines or clusters on the surface. Spores yellow or at length pallid, subglobose or oval, regular or slightly angular, 23–32 by 18–25$\mu$, mostly 24–28 by 21–24$\mu$, wall 2–4$\mu$ thick, marked with both very fine warts and short, very blunt, round tubercules 1–2$\mu$ in diameter, which are wanting on the two attached surfaces but extend around the spore in a band, becoming closely crowded midway between the attached surfaces. Spermogonia amphigenous, scattered, immersed, globose or flask shaped, about 100$\mu$ in diameter, scarcely visible except in section.

On *Dalea laxiflora.* Rockport, Rooks County, Kans., June 12, 1888, E. Bartholomew, No. 228.

This is a peculiar and well-marked species. The upper peridial cells on the inner surface overlap somewhat like the scales of a fish, but also project outward. They are also remarkable for their great size. When the æcidia occur on the petioles they cause an enlargement, but on the leaflets scarcely any thickening can be observed. Mr. Bartholomew remarks that the species is " very abundant, making many of the host plants entirely abortive."

## A STUDY OF THE ABNORMAL STRUCTURES INDUCED BY USTILAGO ZEÆ MAYS.[1]

(Plates II, III, IV, V, VI, VII.)

By Etta L. Knowles.

The fungus known as *Ustilago Zeæ Mays* is found on Indian corn everywhere. It appears in stem, leaf, grain, and in both staminate and pistilate flowers, producing an abnormal growth of tissue sometimes as large as a man's fist, whitish at first but black when the spores ripen, which is about the time of the ripening of the corn.

In order to understand the changes which are produced by the fungus, a careful study was at first made of the normal structures. Alcoholic material gathered July 19, 1887, was used for this purpose and also for the study of the abnormal structures. Schulze's solution was used for staining the sections and glycerine for mounting them. The drawings were all made with a camera and are on the same scale.

Upon examining the stem it was found to consist of an epidermal system and scattered fibro-vascular bundles, of a somewhat oval form in cross section, between which were the rather large cells of the ground differences which have unavoidably made themselves apparent in the metabolic processes."

---

[1] This work was carried on under the direction of Prof. V. M. Spalding, in the botanical laboratory of the University of Michigan, 1888.

Professor Ward was not able to establish the connection of this fungus with any other form, but believes it to be the conidial state of some *Peziza*, of which there would seem to be little doubt.—ERWIN F. SMITH.

---

## EXPLANATION OF PLATES.

### PLATE I.

Figs. 1–11. *Tilletia buchloëana*, Kell. & Sw. on *Buchloe dactyloides*.

1–4. Affected ovaries of various sizes, x 6.

5. A spore showing sub-reticulate markings, and pedicel of attachment (?), x 500.

6. Spore showing unusually prominent spines and two layers of the hyaline envelope, x 500.

7. An optical section of an immature spore showing the two layers of the hyaline coat; the inner extending from the wall to the tips of the spines; the outer spinose and inner lighter thinner wall; the granular layer, and the collapsed center, x 500.

8–10. Optical sections of mature spores showing but one hyaline layer; Fig. 9 shows the rudiment of the pedicel of attachment (?), x 500.

11. A male spikelet consisting of three flowers all bearing ovaries which are filled with the mass of spores.

Figs. 12–25, *Ustilago Andropogonis*, Kell. and Sw. on *Andropogon provincialis* (Figs. 12–18 on *A. provincialis*) and *A. Hallii*, Hack.

12–14. Affected ovaries of various sizes, x 3.

15. A portion of the rachis showing a normal sessile, and a pedicelled flower, also an extra short pedicelled one which (like the sessile one) bears an infested ovary, x 3.

16. A portion of the rachis bearing normal flowers, the sessile pistillate and affected, the pedicelled one staminate and free from the disease.

17. Two spores of *Ustilago andropogonis* from *A. provincialis* seen in optical section showing spines, thickness of cell-wall, and granular contents, x 500.

18. Three spores of same showing common sizes and shapes, x 500.

(Figs. 19–25, *Andropogon Hallii.*)

19–22. Affected ovaries of various sizes, x 3.

23. A portion of the rachis bearing sessile (fertile) and pedicelled (normally sterile) flowers, both producing smutted ovaries.

24. Three spores of *Ustilago andropogonis* from *A. Hallii*, showing common sizes and shapes, x 500.

25. Two spores seen in optical section showing thickness of cell-wall and granular contents, x 500. As will be seen by comparison with Fig. 17 the spores from *A. Hallii* had a slightly thicker wall than those from *A. provincialis.*

Figs. 26–40. *Ustilago boutelouæ*, Kell. & Sw. on *Bouteloua oligostachya.*

26–28. Affected ovaries of various sizes, x 6.

29. An affected spikelet distended and the palet split by the enlarged smutted ovary, x 6.

30. Six spores showing common sizes and shapes, x 500.

31. Three spores seen in optical section showing spines, thickness of wall and slightly granular and guttate ? contents, x 500.

(Figs. 32–40 showing germination of spores of *Ustilago bouteloua* in distilled water on slide in damp chamber 24 hours at 37° C.; collected December 20, 1888, germinated February 20, 1889.)

32. Spore showing cleft in the wall and young promycelium, x 500.
33. Spore bearing a branched promycelium which has split the cell-wall and about to produce a sporidium on the side (?), x 500.
34. Spore showing two promycelia, the one scarcely developed, x 500.
35. Spore seen in optical section showing a slender promycelium apparently connected with the contained gutta, x 500.
36. A spore with a more mature promycelium which is either branched and bearing a sporidium at the end of the branch, or a primary sporidium is producing a secondary one, x 500.
37. A free sporidium budding, x 500.
38. A promycelium broken off from the spore, bearing two sporidia from below the septa, x 500.
39. A free promycelium bearing a single sporidium, x 500.
40. A slender free promycelium producing a single sporidium, x 500.

### PLATE II.

Fig. 1. Cross-section of cells of normal ground tissue; *a*, intercellular spaces.

2. Longitudinal section of cells of normal ground tissue.
3. A section of a portion of the normal epidermis with the underlying parts; *a*, epidermal cells; *b*, sub-epidermal layers; *c*, cells of the ground tissue.

### PLATE III.

4. Cross-section of a normal fibro-vascular bundle; *a*, intercellular canal; *b*, annular vessel; *c*, pitted ducts; *d*, phloëm; *e*, elements of the bundle sheath.
5. Longitudinal section of a normal bundle; *a*, cells of ground tissue; *b*, elements of bundle sheath; *c*, cambiform cells; *d*, sieve tubes; *e*, tracheid; *f*, portions of an annular vessel; *g*, intercellular passage; *h*, wood parenchyma.

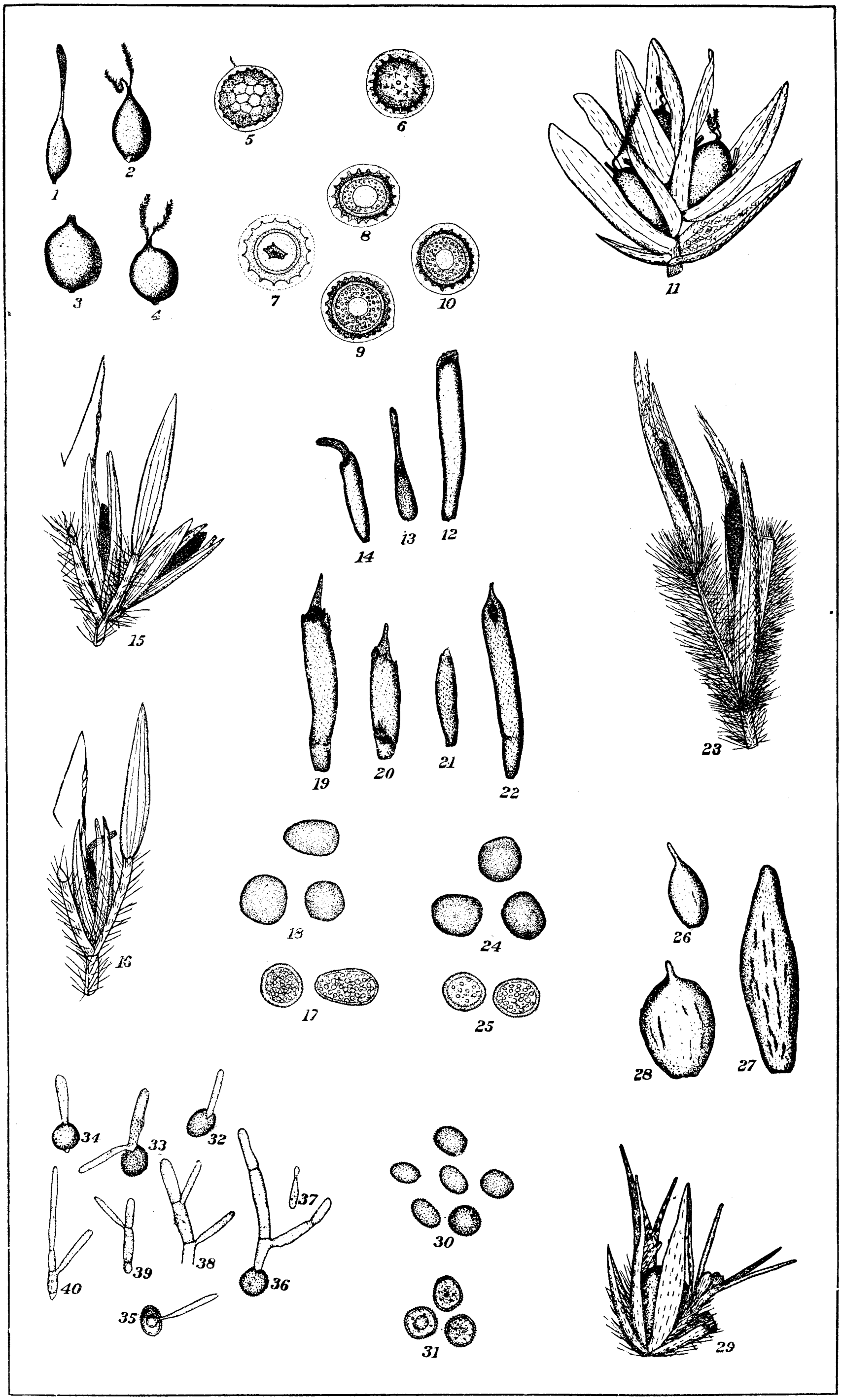
### PLATE IV.

6. Longitudinal section of normal epidermis; *a*, large; *b*, small cells of epidermis; *c*, sub-epidermal cells.
7. Surface view of normal epidermis; *a*, large; *d*, small cells; *b*, guard cells; and *c*, accessory cells of the stomata.
8. Diagram of a section of a stem with the abnormal growth; *a*, *b*, stem; *c*, abnormal growth; *e*, bundles; *d*, region of active growth. The light shading represents ground tissue cells, the dark shading masses of spores, and the lines in *c* the bundles sent out to the abnormal growth.
9. Section similar to that represented in Fig. 3, except that it is slightly distorted; *a*, epidermal and sub-epidermal layers; *b*, ground tissue cells; *c*, portion of a bundle.
10. Surface view of epidermis of abnormal tissue; *a*, epidermal cell; *b*, nucleus.

11, 12. Surface view of abnormal tissue showing distortion of stomata; *a* guard, cells; *b*, accessory cells; *c*, epidermal cell.

Journal of Mycology, U. S. Department of Agriculture, 1889.

PLATE I.



Kellerman & Swingle, del.

KELLERMAN AND SWINGLE ON NEW SPECIES OF KANSAS FUNGI.